

1/16

hfb1 genomic sequence (SEQ ID No 1)

TTTGTATGGC TGGATCTCGA AAGGCCCTG TCATGCCAA GCGTGGCTAA TATCGAATGA
 GGGACACCGA GTTCATATC TCCTGATCAT TCAAACGACA AGTGTGAGGT AGGCAATCCT
 CGTATCCCCT TGCTGGGCTG AAAGCTTCAC ACgtATCGCA TAAGCGTCTC CAACCAAGTGC
 TTAGGTGACC CTTAAGGATA CTTACAGTAA GACTGTATTA AGTCAGTCAC TCTTCACTC
 GGGCTTGAA TACGATCCTC AATACTCCCG ATAACAGTAA GAGGATGATA CAGCCTGCAG
 TTGGCAAATG TAAGCGTAAT TAAACTCAGC TGAACGGGCC TTGTTGAAAG TCTCTCTCGA
 TCAAAGCAAA GCTATCCACA GACAAGGGTT AAGCAGGCTC ACTCTTCCTA CGCCTTGGAT
 ATGCAGCTTG GCCAGCATCG CGCATGGCCA ATGATGCACC CTTCACGGCC CAACGGATCT
 CCCGTTAAC CCCCCGTAA CTTGGCATCA CTCATCTGTG ATCCCAACAG ACTGAGTTGG
 GGGCTGCGGC TGGCGGATGT CGGAGCAAAG GATCACTTCAGA AGAGCCCAGA TCCGGTTGGT
 CCATTGCCAA TGGATCTAGA TTCGGCACCT TGATCTCGAT CACTGAGACA TGGTGAGTTG
 CCCGGACGCA CCACAACCTCC CCCTGTGTCA TTGAGTCCCC ATATGCGTCT TCTCAGCGTG
 CAACTCTGAG ACGGATTAGT CCTCACGATG AAATTAACCT CCAGCTTAAG TTCGTAGCCT
 TGAATGAGTG AAGAAAATTC AAAAACAAAC TGAGTAGAGG TCTTGAGCAG CTGGGGTGGT
 ACGCCCTCC TCGACTCTTG GGACATCGTA CGGCAGAGAA TCAACGGATT CACACCTTG
 GGTGAGATG AGCTGATCTC GACAGATACG TGCTTCACCA CAGCTGCAGC TACCTTGCC
 CAACCATTGC GTTCCAGGAT CTTGATCTAC ATCACCGCAG CACCCGAGCC AGGACGGAGA
 GAACAATCCG GCCACAGAGC AGCACCGCCT TCCAACCTTG CTCCGGCAA CGTCACACAA
 CCTGATATTA GATATCCACC TGGGTGATTG CCATTGCAGA GAGGTGGCAG TTGGTGATAC
 CGACTGGCCA TGCAAGACGC GGCGGGCTA GCTGAAATGT CCCCAGAGGG ACAATTGGGA
 GCGTCTATGA CGGCGTGGAG ACGACGGGAA AGGACTCAGC CGTCATGTT TGTTGCCAAT
 TTGAGATTGT TGACCGGGAA AGGGGGGACG AAGAGGATGG CTGGGTGAGG TGGTATTGGG
 AGGATGCATC ATTGACTCA GTGAGCGATG TAGAGCTCCA AGAATATAAA TATCCCTTCT
 CTGTTCTCTC AAAATCTCTC TCCATCTTG TGCTTCATCAG CACCAAGAGCC AGCCTGAACA
 CCTCCAGTCA ACTTCCCTTA CCAGTACATC TGAATCAACA TCCATTCTT GAAATCTCAC
 CACAACCACC ATCTTCTTC AAATGAAGTT CTTCGCCATC GCCGCTCTCT TTGCCGCCGC
 TGCGTTGCC CAGCCTCTCG AGGACCGCAG CAACGGCAAC GGCATGTTT GCCCTCCCGG
 CCTCTTCAGC AACCCCCAGT GCTGTGCCAC CCAAGTCCTT GGCCTCATCG GCCTTGACTG
 CAAAGTCCGT AAGTTGAGCC ATAACATAAG AATCCTCTTG ACGGAAATAT GCCTTCTCAC
 TCCCTTACCC CTGAACAGCC TCCCAGAACG TTTACGACGG CACCGACTTC CGCAACGTCT
 GCGCCAAAAC CGCGGCCCAAG CCTCTCTGCT GCGTGGCCCC CGTGTAAAGT TGATGCCCA
 GCTCAAGCTC CAGTCTTGG CAAACCCATT CTGACACCCA GACTGCAGGC CGGCCAGGCT
 CTTCTGTGCC AGACCGCCGT CGGTGCTTGA GATGCCGCC CGGGGTCAAG GTGTGCCCGT
 GAGAAAGCCC ACAAAAGTGT GATGAGGACC ATTTCCGTA CTGGGAAAGT TGGCTCCACG
 TGTGTTGGCA GGTTGGGCA AGTTGTGAG ATATTCCATT CGTACGCCAT TCTTATTCTC
 CAATATTTC A GTACACTTT CTTCTATAAT CAAAAAGACT GCTATTCTCT TTGTGACATG
 CCGGAAGGG A CAATTGCTC TTGGTCTCTG TTATTTGCAA GTAGGAGTGG GAGATTGCC
 TTAGAGAAAG TAGAGAAGCT GTGCTTGACC GTGGTGTGAC TCGACGAGGA TGGACTGAGA
 GTGTTAGGAT TAGGTCGAAC GTTGAAGTGT ATACAGGATC GTCTGGCAAC CCACGGATCC
 TATGACTTGA TGCAATGGTG AAGATGAATG ACAGTGTAAAG AGGAAAAGGA AATGTCGCC
 TTCAGCTGAT ATCCACGCCA ATGATACAGC GATATACCTC CAATATCTGT GGGAACGAGA
 CATGACATAT TTGTGGGAAAC AACTCAAAC AGCGAGCCTA GACCTCAATA TGCACATCCA
 AAGCCAAACA TTGGCAAGAC GAGAGACAGT CACATTGTCG TCGAAAGATG GCATCGTACC
 CAAATCATCA GCTCTCATTA TCGCCTAAAC CACAGATTGT TTGCCGTCCC CCAACTCCAA
 AACGTTACTA CAAAAGACAT GGGCGAATGC AAAGACCTGA AAGCAAACCC TTTTGCGAC
 TCAATTCCCT CCTTTGTCTC CGGAATGATG ATCCTTCACC AAGTAAAAGA AAAAGAAGAT
 TGAGATAATA CATGAAAAGC ACAACGGAAA CGAAAGAACC AGGAAAAGAA TAAATCTATC
 ACGCACCTTG TCCCCACACT AAAAGCAACA GGGGGGGTAA AATGAAAT

Fig. 1

2/16

hfb2 genomic sequence (SEQ ID No 2)

HindIII

CTCGAGCAGC TGAAGCTTGC ATGCCATGCAT CCTTTGTGAG CGACTGCATC CATTTCAC
 ACACCGCCGT CGACGTCTCT CTTCCGACCT TGGCCAGCTG GACAAGCAAC ACACCAATGA
 CGCTTGAT TATTAGAGTA TATGCAAGTC TCAGGACTAT CGACTCAACT CTACCCACCG
 AGGACGATCG CGGCACGATA CGCCCTCGTT CTCATTGCC CAAGCAGACC AACTGCCCT
 GGAGCAAGAT TCAGCCCAAG GGAGATGGAC GGCAGGGCAC GCCAGGCC CACCACCAAG
 CCACCTCCCT TGCCCAAATC AGCTTGATG TCAAGAGACA TCGAGCTGTG CCTTGAAATT
 ACTAACAAACC AGGGATGGGA AACGAAGCCT GCTTTGGAA AGACAACAAT GAGAGAGAGA
 GAGAGAGGGA GAGAGACAAT GAGTGCCACA AACCTGGTAG TGCTCCGCCA ATGCGTCTGA
 AATGTCACAT CCGAGTCTTG GGGCCTCTGT GAGAATGTCC AGAGTAATAC GTGTTTGCG
 AATAGTCCTC TTCTTGAGG ACTGGATACC TACGATACCC TTTTGAGTT GATCGGTGC
 TTTCGAAGTA TTATCTGGAG GATAGAAGAC GTCTAGGTAA CTACACAAA GGCCTATACT
 TTGGGAGTA GCCCAACGAA AGGTAACCTCC TACGGCCTCT TAGAGCCGTC ATAGATCCTA
 CAGCCTCTTG GAGCCGTAT AGATCACATC TGTTAGACC GACATTCTAT GAATAATCAT
 CTCATCATGG CCACATACTA CTACATACGT GTCTCTGCC ACCTGACATG TAGCAGTGGC
 CAAGACACCA AGGCCCCAGC ATCAAGCCTC CCTACCTATC CCTCCATTG TACAGCGCA
 GAGAGATTGC GATGAGCCCT CTCCCTACCT ACAGACGCT GACAATGTCC GTATACCACC
 AGCCACGTG ATGAAAACAA GGACATGAGG AACAGCCTGC GAGAGCTGGA AGATGAAGAG
 GGCCAGAAAA AAAAGTATAA AGAACACCTC GATTCCCAC GATCCACAAAT CTTTCCATC
 CTCATCAGCA CACTCATCTA CAACCATCAC CACATTCACT CAACCTCTCT TTCTCAACTC
 TCCAAACACA AACATTCTT GTTGAATACC AACCATCAC ACCCTCAAG ATGCAGTTCT
TCGCCGTGCG CCTCTTCGCC ACCAGCGCC TGGCTGTG CTGCCCTAC GGCCTCTTCT
CCAACCTCT GTGCTGTGCC ACCAACGTCC TCGACCTCAT TGGCGTTGAC TGCAAGACCC
GTATGTTGAA TTCCAATCTC TGGGCATCCT GACATTGGAC GATACAGTTG ACTTACACGA
TGCTTACAG CTACCATCGC CGTGCACACT GGCAGCTACT TCCAGGCTCA CTGTGCCAGC
AAGGGCTCCA AGCCTCTTG CTGCGTTGCT CCCGTGAA GTAGTGTG CAATGCCAAA
GAAGTAAAAA GACATTGGG CCTGGGATCG CTAACCTTG ATATCAAGGC CGACCAGGCT
CTCCTGTGCC AGAAGGCCAT CGGCACCTTC TAAAGCAATG GCTTGCTTTA CTGCCGGCAG
 TCTTGAGAA CTCTGGCCTC ACAAAAGACG ACTTGATGT ATCATGGGGG CTCGCAAATG
 GGAGGATTTG GAGGGGATTG AGGCTGGTT TGGCCTATTA GAGGATTGCA TAATGGAAGA
 TTTGCGAGCA GGACATAGAC GTATCTAGAG TTCTAGTCAA TACATTATTG AAAAGTTGGA
 GTATACTAT CGCTGGCACT GGTATCTTGA AGATATCTC TCTCTTG TGAGTTATGTA
 TGGCAATCAG TCGAAATCTA TTTGAAGACA GAGCTCAAGC TTCAAACATT CACCTGNGAA
 TTGACCATT TGTTCGATG GTTGCAGTTG GTGGGTGTCA CTTCTGCAAT CATGTACGAG
 CACAAGTATA GCAGTATTCC ATCTGATCTG CATCTGGTA AATGTCGCCA CTCTACCTAG
 GTACCAATA AATACCGAAT TGGTCAGCTC TCGGGTGACA AACCGGCCG CTTTTCGACC
 GTGCTCTGTC CAATTCTAGG CTTGCAATG GTTCCCTGACT GTGATAAACCC TTGGAGCTAN
 CATAACTTAC CTTACAATAA ATCCAACCTGC CGGCACTTGC TTCCCTTCAC CCAACCAACTC
 GCAAACATCA CGAACCTGT CTCGATCCCC TGTCCGAAAT CTGCTTGCA ACGTATCATC
 ACAAAATCATA CACACAGACA AAAAGGAGCC AAAGCAGCAA TGGCAAGACA CCGAGGCCGG
 CAGCGCGCC GTCGCCGTT TAAAAAAGCG AAGCGAAAG GGCAAAGCCA ACCTGCGCAA
 ACGAACAAACG AAGCCTTCCC CCCGCCGCGA GCGACAGCGA CAGCGACAGC GACTTTCC
 CGTCGGAAGA CGAAGGCCGG CACAGAGTC AGAGGCGAA GAGGACGCC GTCGTCACCG
 CCGCCGCGGA GGGGCCGCCG GCCCAGCAAC CGGGACGACG CGGGCGGCC AACAGGCC
 TTCACGGCCA ACAGAAGCGT CCCGATTGCT GACAGCAACG ACGCGACCAA GCACAGCAAC
 TGGTACGACG AGGACGAAA GGACCGCTC TCGGCAAAGA ACCTCCTCGG ATCTTCGAGA
 GCGTCCAAGG ACGCGCAGCC AGACGGCAGC TACAAGGCC TGGCGAACCA GACGTCTTT
 ATACAAAAGA ATCCGGATGC GCCCGGAAG ACAGTTGGC CCGTCAGGC GCCTACCAAC
 ATCCGACCG TCACCATTAC AGATTATGCC CGGACACGT GTAAAGAGTG AGTTGCATC
 AATAGCCAGA ATCCCCCCCC CCGATACCGT ACATTGAGCA TATGCTGACT CGTCATAATC
 TTTCTAGTTA TCGCATAACC GGCTATATAA GTACTCCCT TTTCCATGAT TATTCCAGTC
 GCGTACTGAC ATTCTAGGA GCCTTACTG TGGTTTGCG GACAATTGCA AGTATCTTCA
 CGCGAGAGAA GACCTCAAGG CAGGCTGGCA GCTGGATCAA GAGTGGAAA AGGTCAACCA
 GGGCAAGAAG AACCTGGGGG GAACGGTAGT GGCCAGCGC AACCGGAACA AGGCCAAGGT

Fig. 2A

10 / 050000

3/16

GGACGAGGGC GACGACGACG ACGACGAAGA GGCGATGCTC GAGAACATTG CGTTTGCCTG
CATCATCTGC AGGGAATCGT ACAAGGAGCC GATTGTGACG AGGTGCGGGC ACTACTTTG
CCTGCCGTGC GCTCTGCAGC GGTACAAGAA GGATCCGACG TGTGCGGGGT GTGGCTCGGG
CACGAATGGC GTGTTTAATT CGGCAGCAGAG GTTGAAGAAG CTGCTGGAGA AGAAGAGGGA
GAGGGCGGCC AGGAGGAGAC AGGAGGCAT AGAGAGGGC GAGGAAGTCA GTGATGAAGA
GGAGGAGGAG GAGGAGGACT GATGATGATG GGGCNAGATG ACGATGCAGG TCGACTCTAG
AGATCCCCGG TACCGAGCTC GAATTCATGATATCAG ATCCC

EcoRV

Fig. 2B

4/16

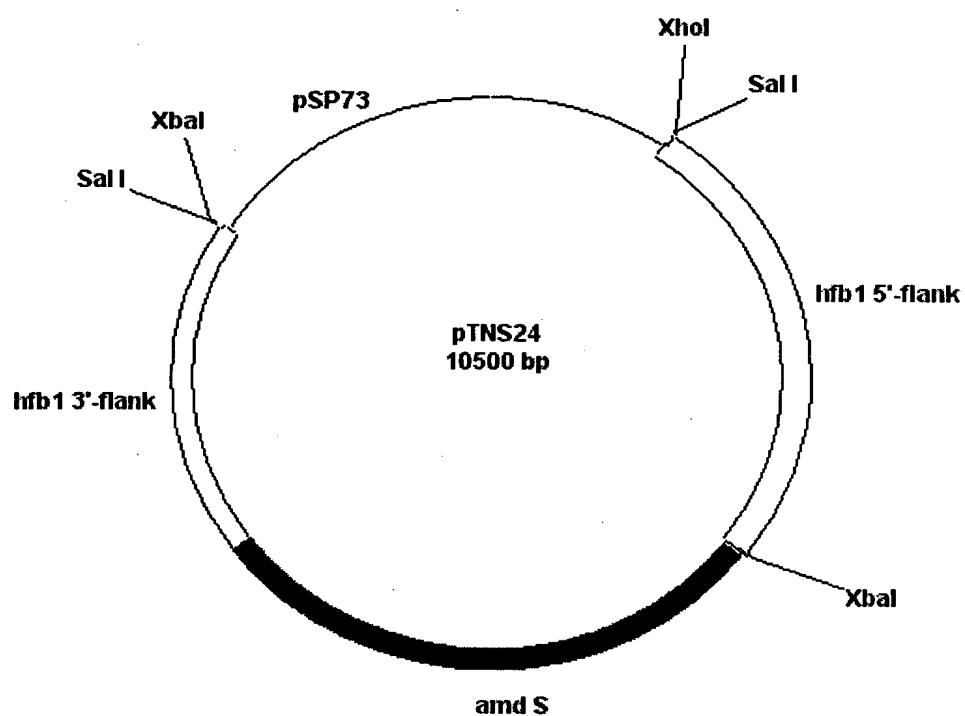


Fig. 3

5/16

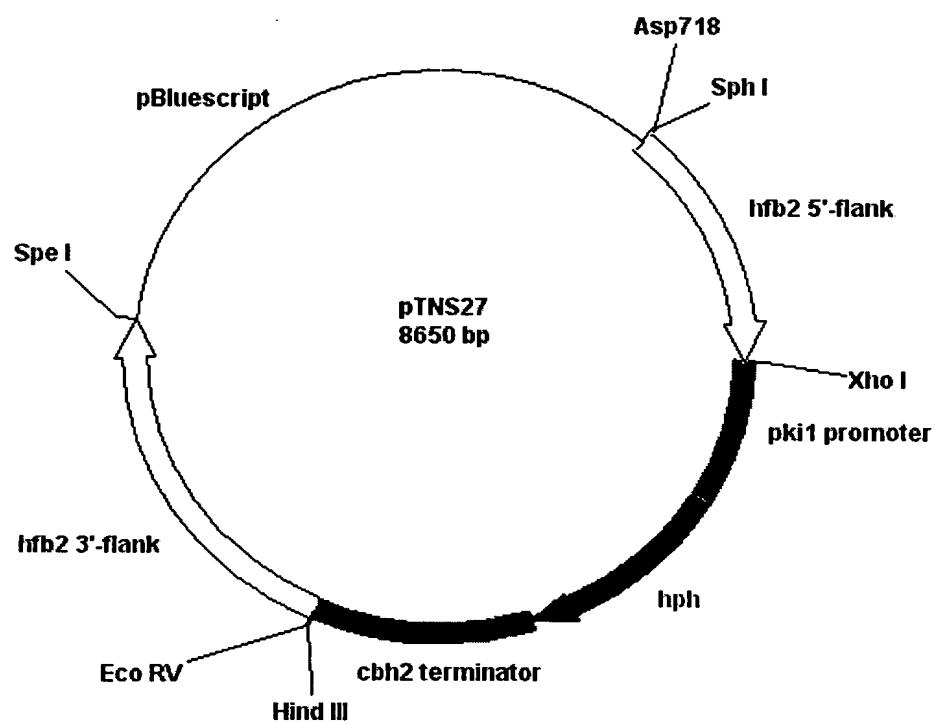


Fig. 4

6/16

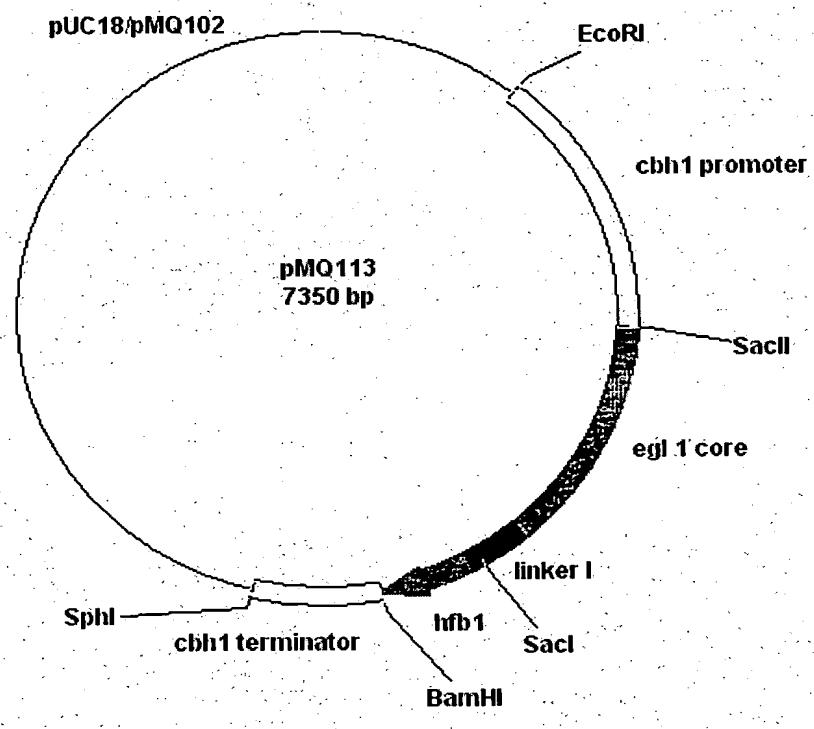


Fig. 5

7/16

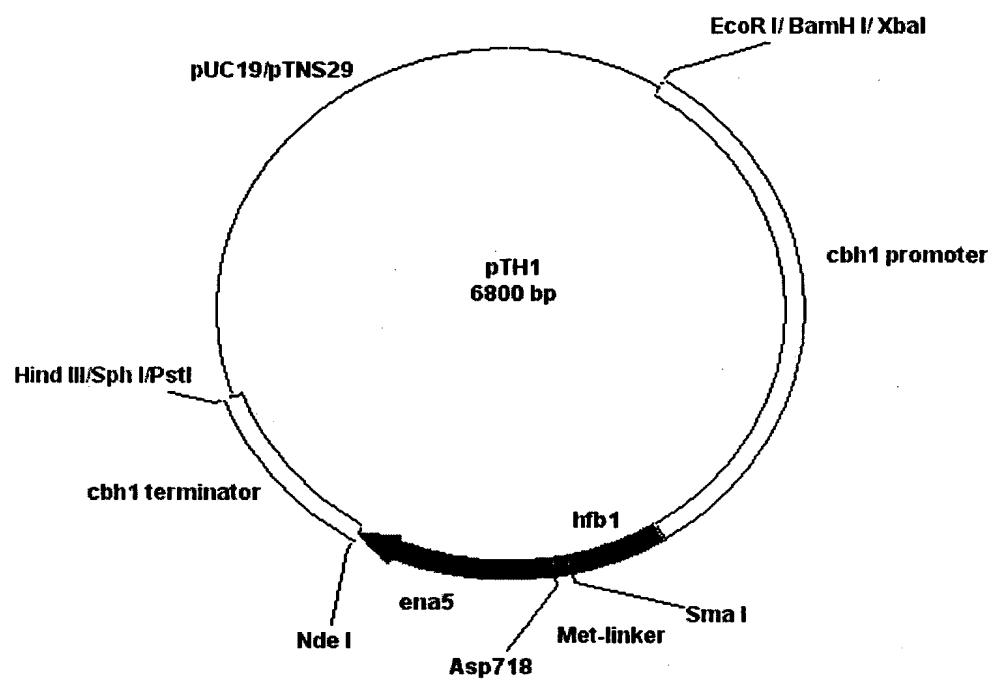
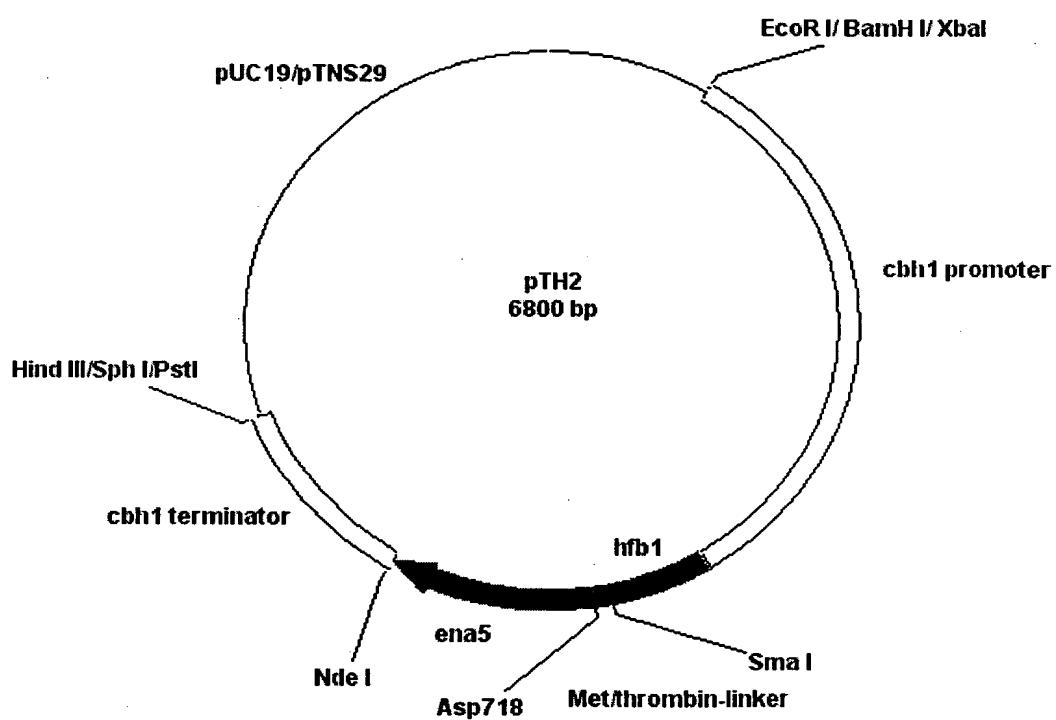


Fig. 6

8/16

**Fig. 7**

Strain Rut C30

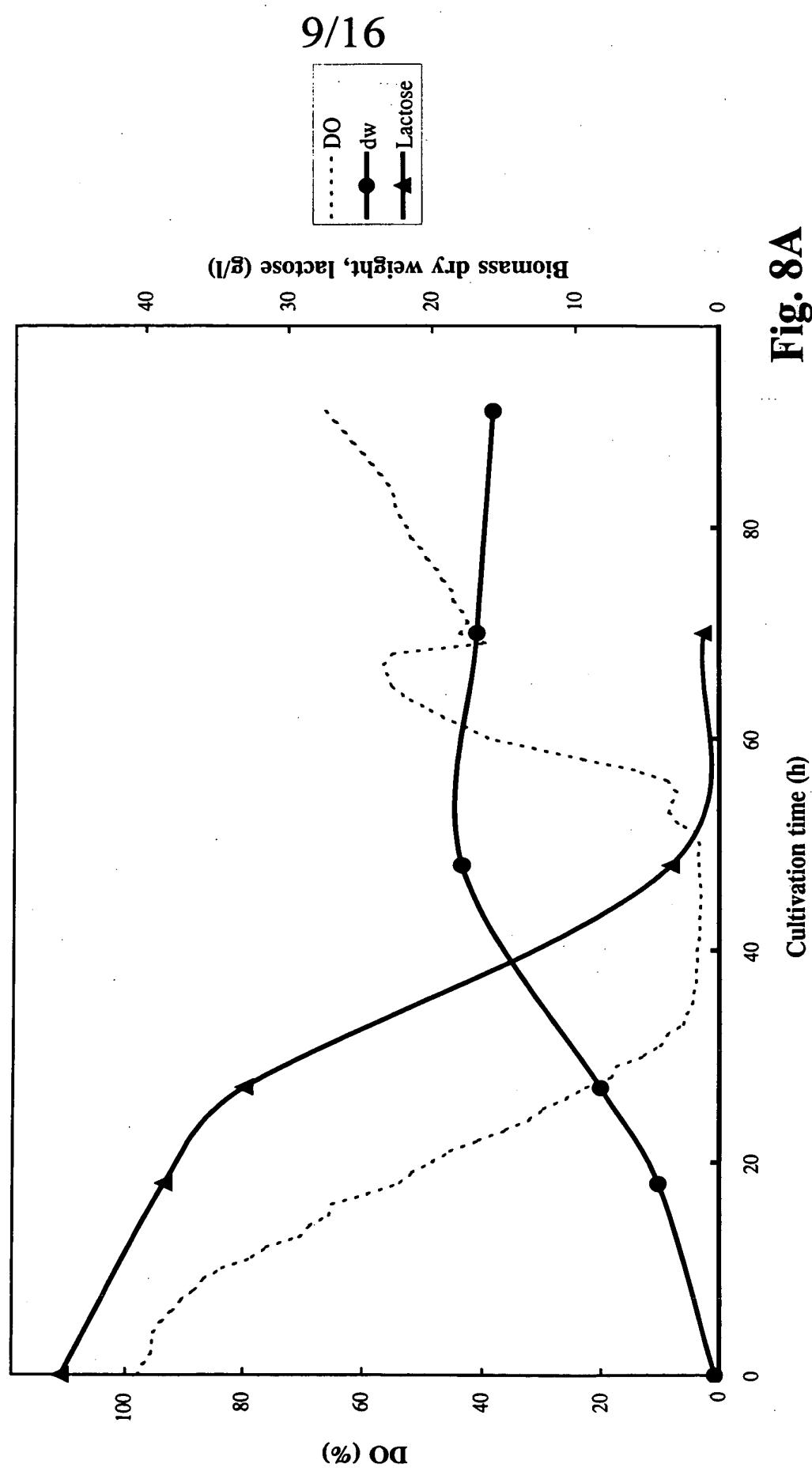


Fig. 8A

10/16

Strain VTT D-99676

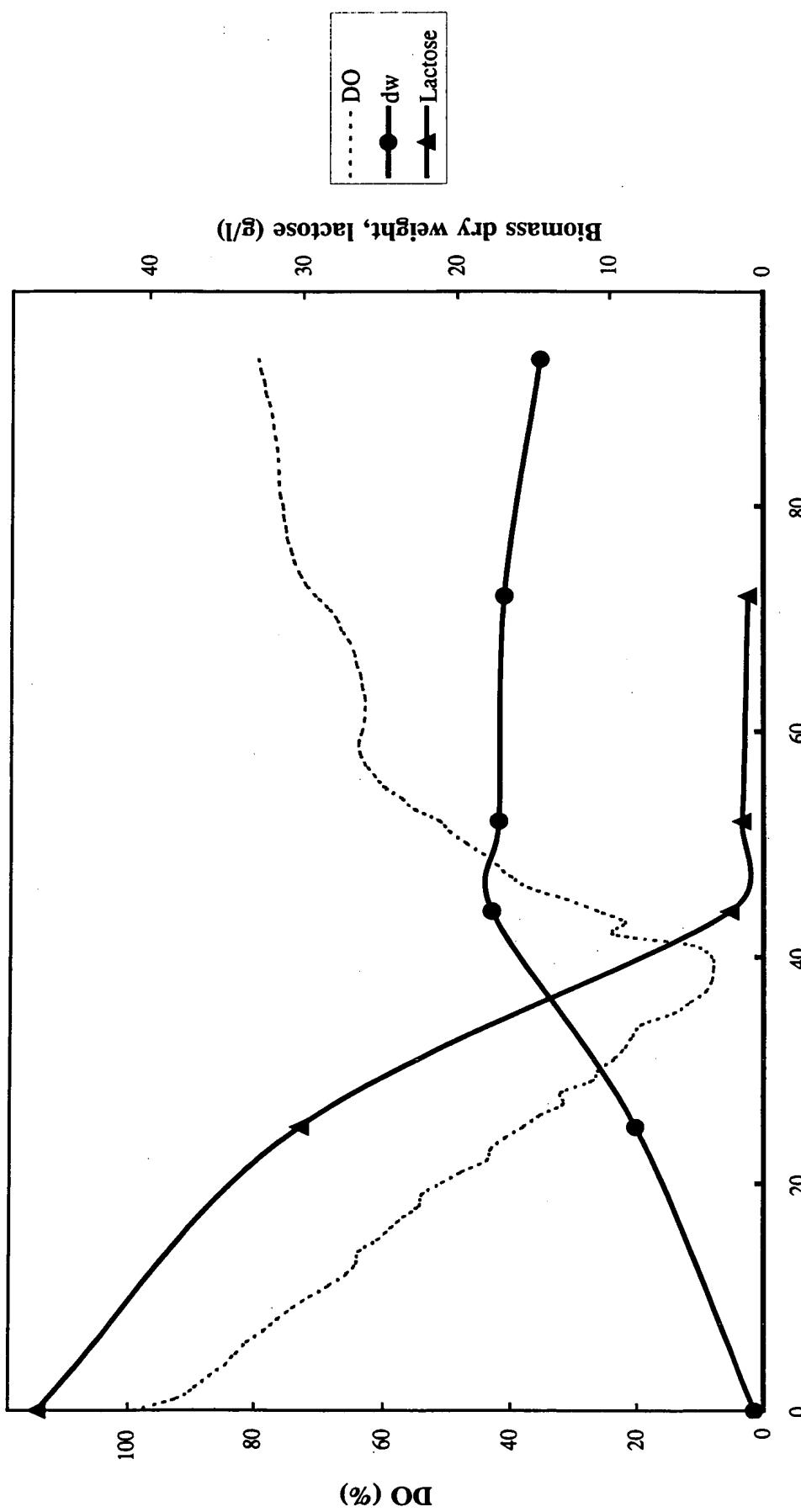


Fig. 8B

Strain Rut C30

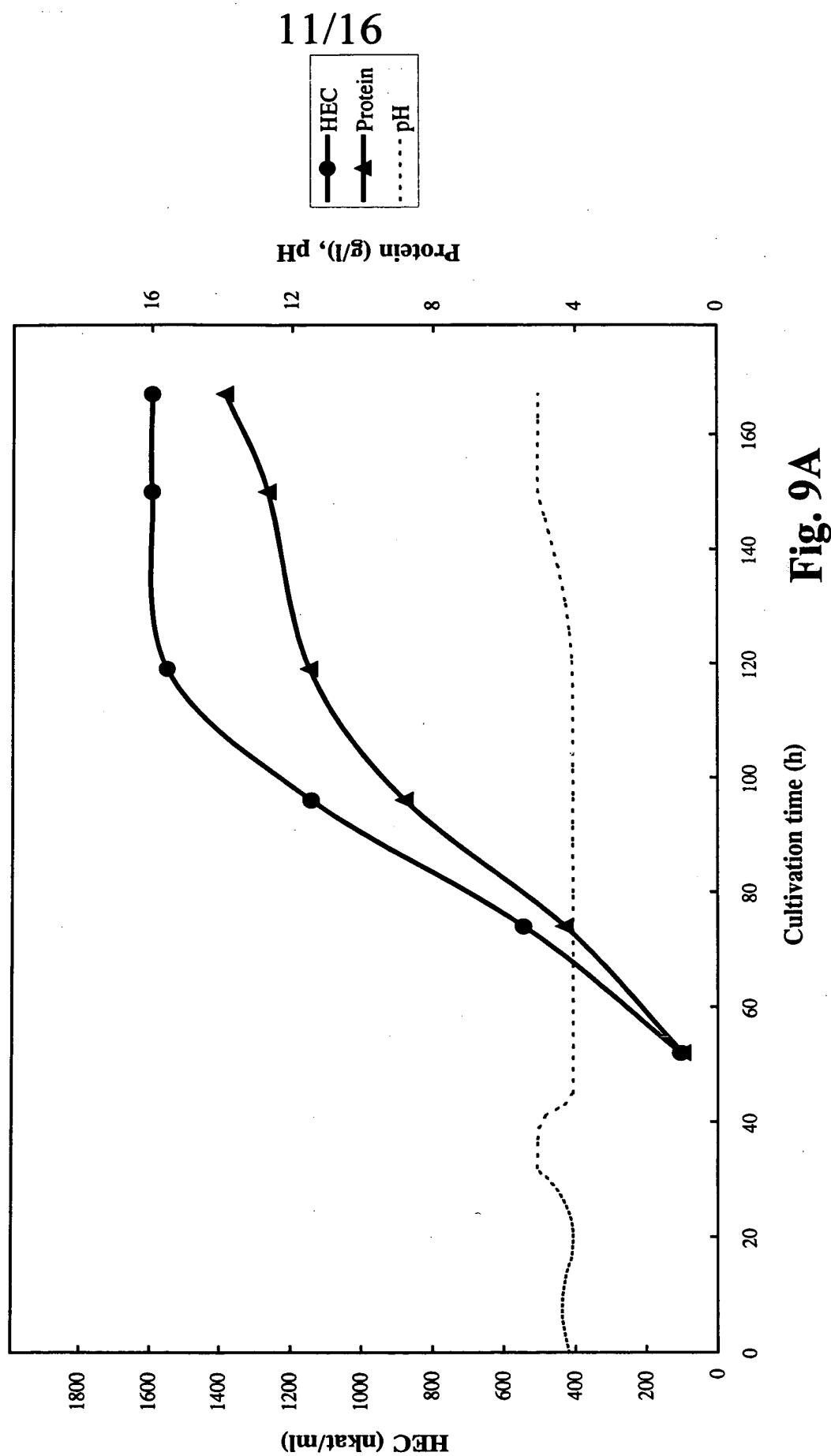


Fig. 9A

Strain VTR D-99676

12/16

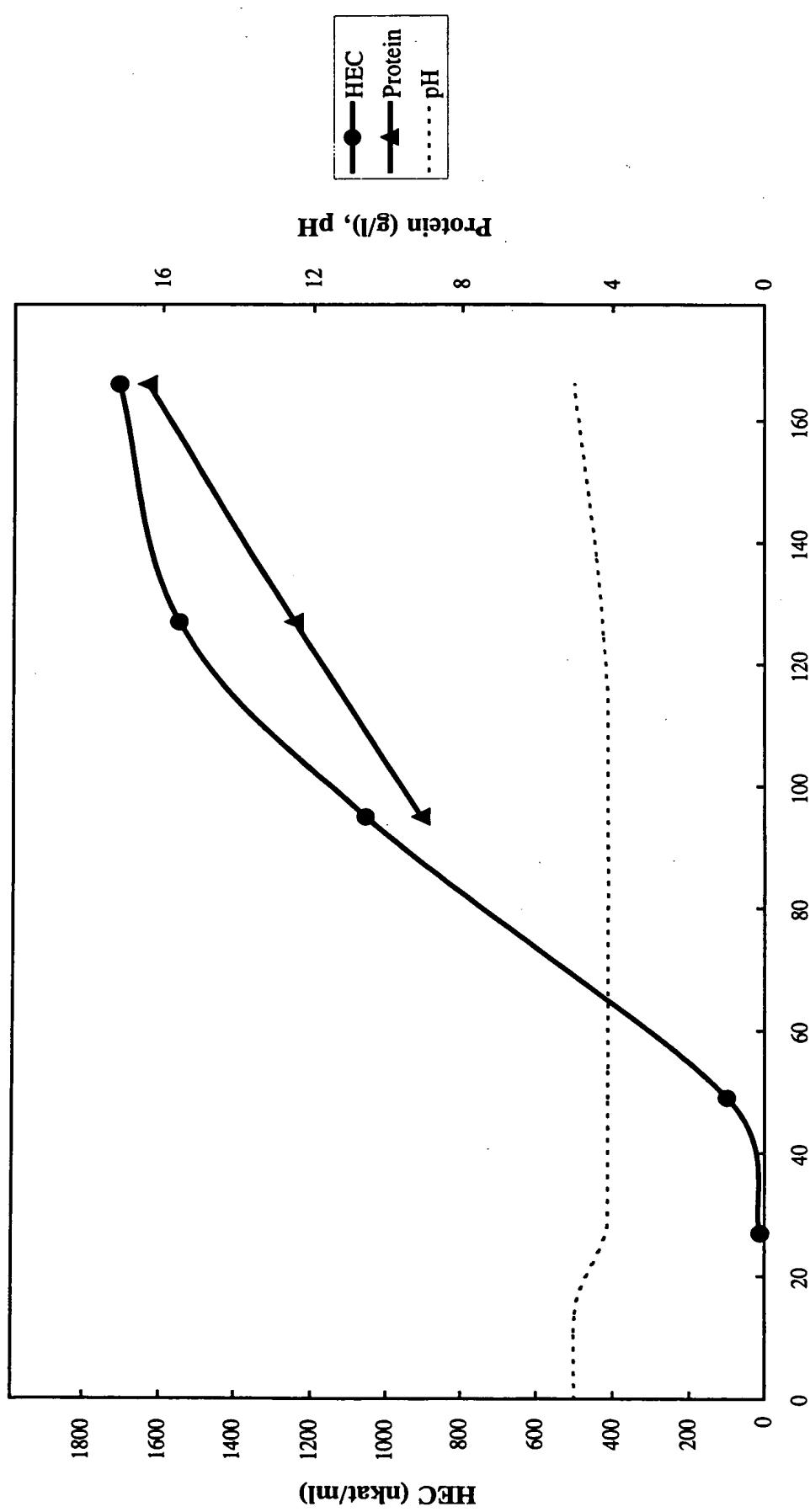


Fig. 9B

13/16

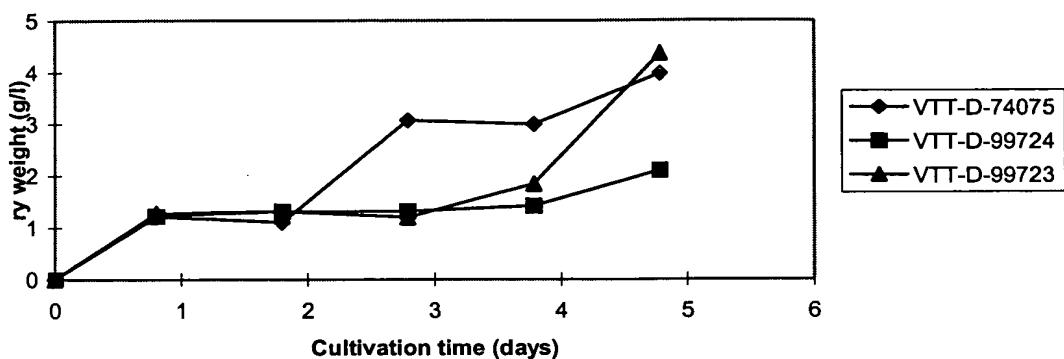


Fig. 10

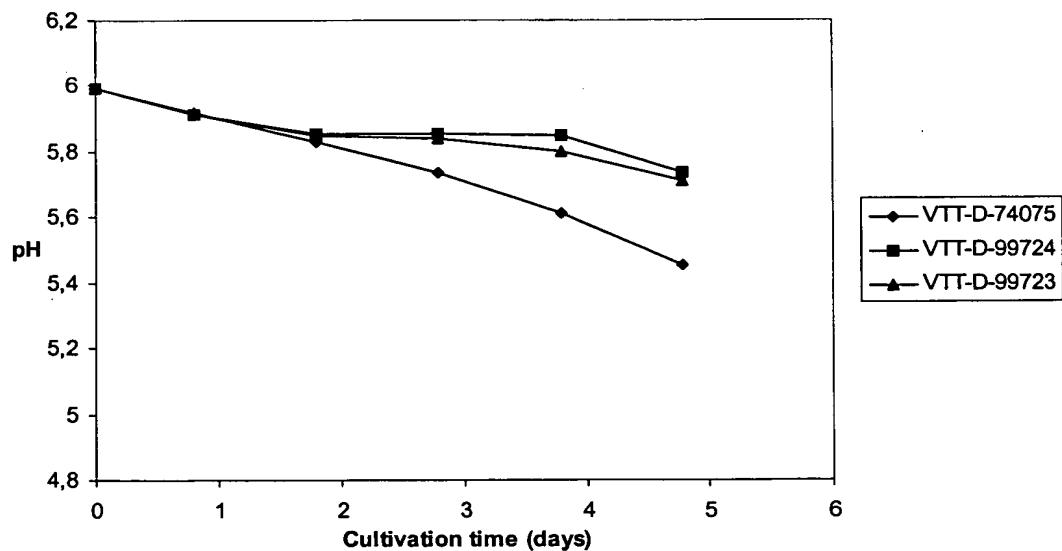


Fig. 11

14/16

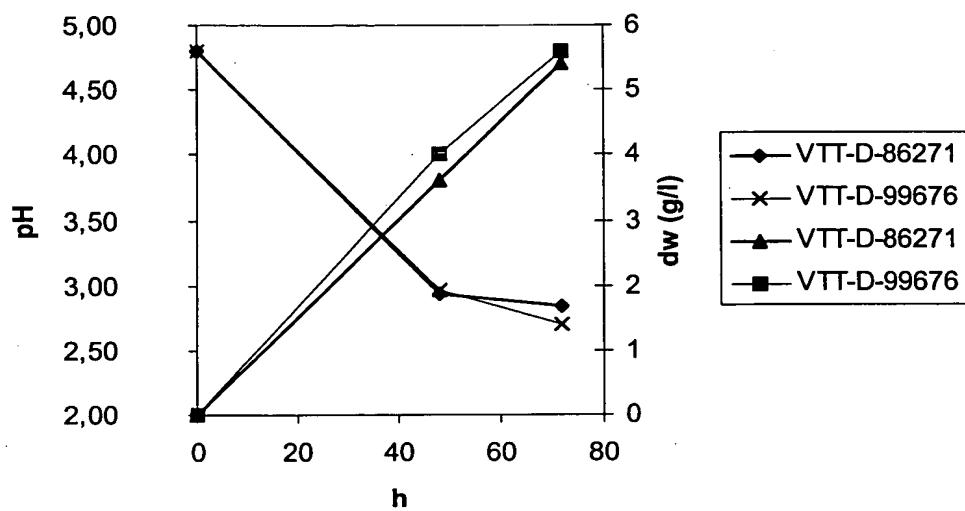
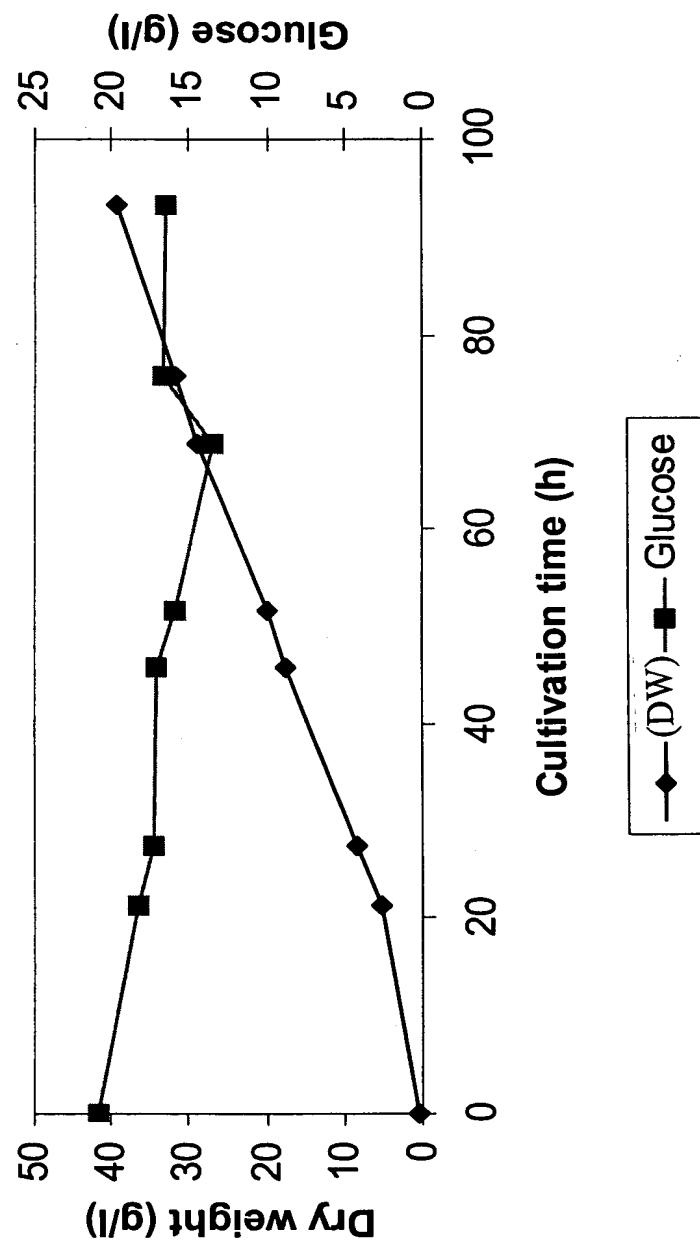


Fig. 12

15/16

Strain QM9414**Fig. 13A**

16/16

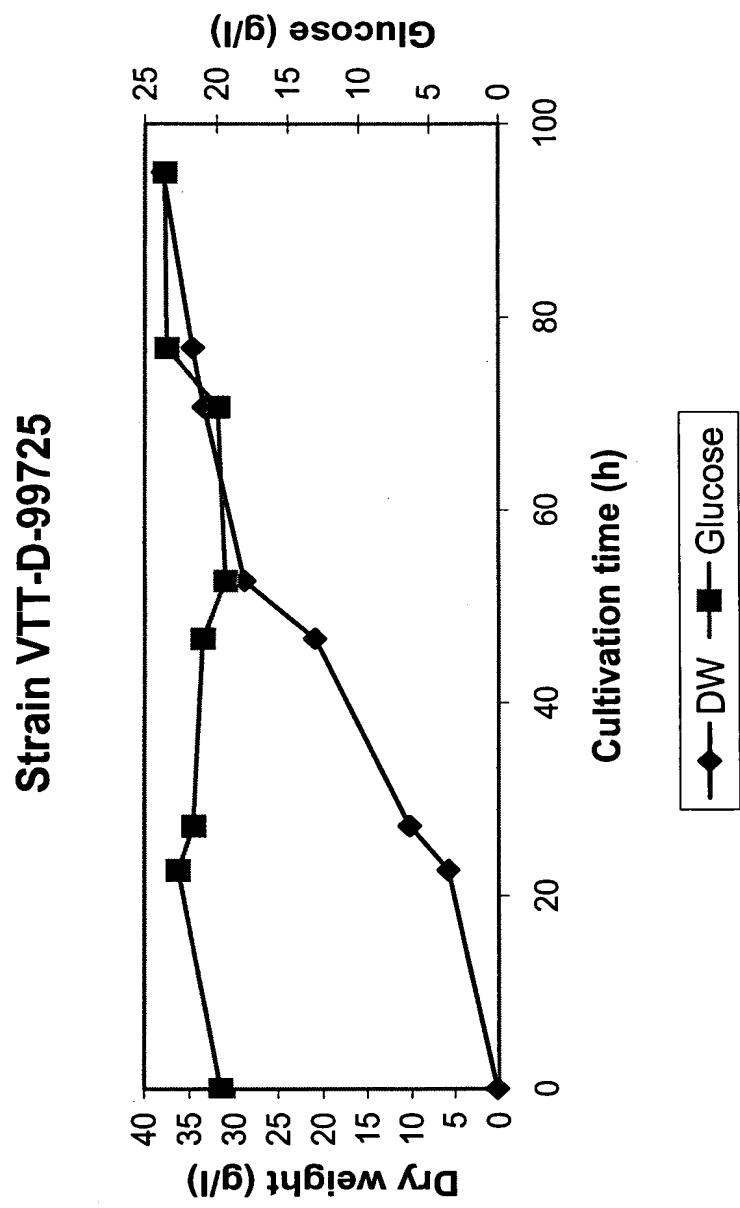


Fig. 13B